CLAIMS:

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1. A configurable electronic controller for appliances comprising:
   - a Non-Volatile Memory containing configuration data,
   - a configurable Central Control Unit which performs the basic processing and control of the functioning of the appliance, and is configured for the required functionality by the configuration data supplied by the said Non-Volatile Memory,
   - one set of inputs of the said Central Control Unit are connected to the outputs of an Input Interface Unit which receives the signals from various sensing elements in the appliance and conditions these signals for further processing by the said Central Control Unit,
   - one set of outputs of the said Central Control Unit are fed back to the said Input Interface Unit for controlling its internal operation,
   - a second set of inputs of the said Central Control Unit receive user input data from the outputs of a User Interface Unit,
   - a second set of outputs of the said Central Control Unit are fed back to the said User Interface Unit as signals for outputting data to the user by visual and audible means, as well as for controlling its internal operation,
   - a third input of the said Central Control Unit is connected to one output of a Load Interface Unit to provide data on load conditions,
   - a third set of outputs from the said Central Control Unit are connected to the inputs of the said Load Interface Unit which drives the actuating means in the appliance for controlling its operation,

- a fourth input of the said Central Control Unit receives power supply condition signals from a Supply Interface Unit,
- the said Non-Volatile Memory Unit provides non-volatile storage of data and is connected to main circuit blocks consisting of the said Central Control Unit, Input Interface Unit, User Interface Unit, Load Interface Unit, and Supply Interface Unit,
- the output of a Clock Generator circuit is connected to one input of each of the said main circuit blocks and produces a clock signal required for their operation,
- the output of a Reset circuit is connected to one input of each of the said main circuit blocks and produces a reset signal required for their proper initialization,
- The arrangement between the components of the main circuit blocks is such that the said Central Control Unit receives sensed parameter data supplied by the various sensing devices in the appliance, from the said Input Interface Unit, user requirement data from the said User Interface Unit, load conditions data from the said Load Interface Unit, and the supply conditions data from the said Supply Interface Unit, and processes all this data in accordance with its configured functionality, and then applies signals to the inputs of the said Load Interface Unit for operating the actuating devices in the appliance for controlling its operation, and to the inputs of the said User Interface Unit for providing feedback to the user.

2. A Configurable Electronic Controller as claimed in claim 1, wherein the said Central Control Unit consists of:
   - a Configurable Logic Circuit for implementing the basic control algorithms that determine the functioning of the appliance, which

is configured for the required functionality by the configuration data supplied by the said Non-Volatile Memory

- one set of inputs of the said Configurable Logic Circuit are connected to the outputs of he said Input Interface Unit for receiving the signals from various sensing elements in the appliance,
- one set of outputs of the said Configurable Logic Circuit is connected to the input of the said Input Interface Unit for controlling its internal operation,
- a second set of inputs of the said Configurable Logic Circuit is connected to one output of the said User Interface Unit for receiving user supplied data,
- a second set of outputs of the said Configurable Logic Circuit is connected to the input of the said User Interface Unit for supplying feedback to the user as well as for controlling the internal operation of the said User Interface Unit,
- a third input of the said Configurable Logic Circuit is connected to one output of the said Load Interface Unit for receiving data about the load conditions,
- a third set of outputs of the said Configurable Logic Circuit is connected to one input of the said Load Interface Unit for controlling the load as well as for controlling the internal operation of the said Load Interface Unit,
- a fourth input of the said Configurable Logic Circuit is connected to one output of the said Supply Interface for receiving data on the supply conditions,
- a fifth input of the said Configurable Logic Circuit is connected to a Counters and timers block which contains an array of counters and timers required for the operation of the appliance,

- a sixth input of the said Configurable Logic Circuit is connected to a memory circuit for reading of data stored therein,
- a fifth output of the said Configurable Logic Circuit is connected to the said memory circuit for writing data into it,
- a seventh input of the said Configurable Logic Circuit is connected to the output of a Sequence Control circuit which provides the control signals required for defining the sequence of operations performed by the said Configurable Logic Circuit,
- an eighth input of the said Configurable Logic Circuit is connected to a Real-Time-Clock (RTC) circuit which provides time-of-day information required for the functioning of the Configurable Logic Circuit,
- a sixth output of the said Configurable Logic Circuit is connected to the input of the said RTC circuit for setting its value when required.
- the arrangement between the said Configurable Logic Circuit, Sequence Control circuit, Counters and Timers block, Memory block, and RTC circuit is such that the sensor data received from the said Input Interface Unit, user requirement data received from the said User Interface Unit, load conditions data supplied by the said Load Interface Unit, and supply conditions data furnished by the said Supply Interface Unit, are processed by the said Configurable Logic Circuit under the control of signals from the said Sequence Control circuit, using data supplied by the said Memory block, said Counters and Timers block and said RTC circuit, to generate the outputs required to control the loads through the said Load Interface Unit, provide feedback data required for the user through the said User Interface Unit, as well as supply signals required to update the data stored in the said Memory block, said

Counters and Timers block and said RTC circuit, for use in subsequent processing.

3. A Configurable Electronic Controller as claimed in claim 1, wherein the said Input Interface Unit consists of:

- Sensor Drive circuits for providing bias signals to external sensing devices connected to the Electronic Appliance Controller,
- the output of each of the said Sensor Drive circuit is connected to the input of one channel of an Analog Multiplexer,
- the output of the said Analog Multiplexer is connected to the input of an Analog-to-Digital Converter,
- the said Analog-to-Digital Converter contains in-built circuitry for the correction for the sensitivity and offset of the signal from each sensing device,
- the output of the said Analog-to-Digital converter is connected to one input of a Digital Comparator,
- the other input of the said Digital Comparator is connected to the said Central Control Unit for receiving a reference signal,
- the output of the said Digital Comparator is connected to one input of a Digital Multiplexer,
- the other inputs of the said Digital Multiplexer receive digital signals from various sensing devices in the appliance,
- the output of the said Digital Multiplexer is connected to the input of a Noise Filter,
- the output of the said Noise Filter is connected to an input of the said Central Control Unit for furnishing data on the signals received from the various sensing devices,
- a Digital Demultiplexer receives input signals from the said Central Control unit and produces multiple digital output signals for

scanning the status of various digital sensing devices in the appliance,

- the arrangement between the said Analog Multiplexer, said Analog-to-Digital Converter, said Digital Comparator, said Digital Multiplexer, and said Noise Filter is such that the sensor data received from analog sensors is selected by the said Analog Multiplexer Circuit under the control of signals from the said Central Control Unit, converted to digital form by the said Analog-to-Digital converter and applied to the inputs of the said Digital Multiplexer which also receives other digital signals directly from digital sensing devices in the appliance which are scanned by signals supplied by the said Digital Demultiplexer using signals supplied by the said Central Control Unit, and then applies these one-at-a-time under control of signals from the said Central Control Unit, to the input of the said Noise Filter for filtering and supplying to the said Central Control Unit for processing.

4. A Configurable Electronic Controller as claimed in claim 1, wherein the said User Interface Unit consists of:

- Sensor Drive circuits for providing bias signals to various analog components, such as potentiometers, used for obtaining user selection values,
- the output of each of the said Sensor Drive circuits is connected to the input of one channel of an Analog Multiplexer,
- the output of the said Analog Multiplexer is connected to the input of an Analog-to-Digital Converter,
- the said Analog-to-Digital Converter contains circuitry for providing in-built correction for the sensitivity and offset of the signal from each sensing device,

- the output of the said Analog-to-Digital converter is connected to one input of a Digital Comparator,
- the other input of the said Digital Comparator is a reference signal received by the User Interface Unit from the Central Control Unit,
- the output of the said Digital Comparator is connected to one input of a Digital Multiplexer,
- the other inputs of the said Digital Multiplexer receive digital signals from various front-panel switches provided for receiving user input,
- the output of the said Digital Multiplexer is connected to the input of a Noise Filter,
- the output of the said Noise Filter is connected to an input of the said Central Control Unit,
- a Digital Demultiplexer receives input signals from the said Central Control unit and produces multiple digital output signals for scanning the status of the various digital inputs, such as switches, for obtaining user input,
- a second set of signals from the said Central Control Unit are connected to a set of Latches,
- the output of each of the said Latches is connected to the input of a Display and Audio Driver circuit which contains the circuitry for driving the display device and audio output device for providing output data to the user,
- the arrangement between the said Analog Multiplexer, said Analog-to-Digital Converter, said Digital Comparator, said Digital Multiplexer, said Noise Filter, said Digital Demultiplexer, and said Display and Audio Driver circuits is such that the sensor data received from the analog sensors in the User Interface is selected by the said Analog Multiplexer Circuit under the control of signals

from the said Central Control Unit, converted to digital form by the said Analog-to-Digital converter and applied to the inputs of the said Digital Multiplexer which also receives other digital signals received directly from digital sensing devices in the User Interface which are scanned by signals supplied by the said Digital Demultiplexer using signals from the Central Control Unit, and selectively applies them to the said Noise Filter under control of the said Central Control Unit, for filtering and supplying to the said Central Control Unit for processing, while simultaneously the said Display and Audio Driver circuit drives the external display and audio output devices in accordance with the data supplied by the said Central Control Unit.

A Configurable Electronic Controller as claimed in claim 1, wherein the said Load Interface Unit consists of:

- a plurality of Latches for storing the data received from the said Central Control Unit,
- the output of each of the said Latches is connected to the input of a Switch Control circuit,
- the output of each of the said Switch Control circuits drives a Switch that operates a Load which is an actuating device in the appliance used to control its operation,
- one end of each of the said Switches is connected to the Load while the other end of the Switch is connected to a Current Sensor for sensing the current through the load,
- the output from each of the said Current Sensors is connected to one input of an Analog Multiplexer,

- the output of the said Analog Multiplexer is connected to the input of a Load Sense Circuit which incorporates in-built correction for the sensitivity and offset of the signal from each Shunt,
- the output of the said Load Sense Circuit is connected to one input of a Digital Comparator,
- the other input of the said Digital Comparator is a reference signal received by the said Load Interface Unit from the Central Control Unit,
- the output of the said Digital Comparator is connected to an input of the said Central Control Unit,
- the arrangement between the said Latches, said Switch Drive Circuits, said Switches, said Current Sensors, said Analog Multiplexer, said Load Current Sensing Circuit, said Digital Comparator and said output Latch, is such that the load current data received by the said Load Current Sensors is converted to digital form by the said Load Current Sense Circuit, compared with reference data supplied from the said Central Control Unit by the said Digital Comparator and supplied to the said Central Control Unit which furnishes signals for controlling the operation of the said Switch Drive Circuits through the said Latches.

6. A Configurable Electronic Controller as claimed in claim 1, wherein the said Supply Interface Unit consists of:
- a Supply Voltage Sense circuit which senses the voltage level of the input supply voltage,
- the output of the said Supply Voltage Sense circuit is connected to one input of each of two digital comparators,
- the second input of each of the said Digital Comparators is connected to a signal received from the said Central Control Unit,

- the outputs of the said Digital Comparators are connected to the input of a Latch,
- the output of the said Latch is connected to an input of the said Central Control Unit,
- the arrangement between the said Supply Voltage Sense circuit, said Digital Comparators, and said Latch is such that the sensed supply voltage is converted to digital form by the said Supply Voltage Sense circuit and compared by the said Digital Comparators with reference data supplied by the said Non-Volatile Memory, and the results of the comparison are latched by the said Latch and furnished to the said Central Control Unit as supply condition data.

7. A Configurable Electronic Controller as claimed in claim 1, wherein it further includes a Network Interface Unit that is connected to another output from the said Central Control Unit and provides an input to the said Central Control Unit for exchanging data between an external network and the said Central Control Unit.

8. A Configurable Electronic Controller as claimed in claim 1, wherein the said Configurable Logic Unit in one implementation is a Gate Array that is configured by the configuration data supplied by the said Non-Volatile Memory.

9. A Configurable Electronic Controller as claimed in claim 1, wherein the said Configurable Logic Unit in another implementation is an embedded microprogrammed controller that is configured by the configuration data supplied by the said Non-Volatile Memory.

10. A Configurable Electronic Controller as claimed in claim 1, wherein the said Configurable Logic Unit in another implementation is configurable for providing overcurrent protection and "Soft Start" facility that supplies a reduced voltage start to the load in order to minimize in-rush current stress at turn-on, selectively to the loads through the signals applied to the inputs of the said Load Interface Unit.

11. A Configurable Electronic Controller as claimed in claim 1, wherein the said Configurable Logic Unit in another implementation is configurable for providing overheat protection selectively to the loads using temperature data supplied by sensing devices physically attached to the selected loads through the signals supplied by the said Input Interface Unit, and supplying applying signals to the inputs of the said Load Interface Unit to turn-off the drive to the loads in case of overheat conditions.

12. A Configurable Electronic Controller as claimed in claim 1, wherein the said Clock Generator is an oscillator with a frequency preferably in the range 32 KHz to 25 MHz.